Math 211 – Calculus and Analytic Geometry III

Spring 2011 Syllabus

Instructor:	Kevin Hartshorn
Class Meetings:	PPHAC 330, MWF 11:45am–12:55pm
Office Hours:	PPHAC 215
	TuWTh 9-10am, *or by appointment*
e-mail:	`hartshorn@math.moravian.edu`
Website:	`http://math.moravian.edu/hartshorn/211`

1 Required Materials

The required text is Susan Colley's *Vector Calculus* (3rd Edition). This course will likely cover most of the first 7 chapters of the text.

In addition, I recommend a copy of a textbook covering the material from Calculus I and II. Any edition of Stewart's *Calculus* (used in Math 170/171) would be fine. You can view Strang's calculus text for free at the MIT OpenCourseware[1] site.

This course will make use of *Maple* for computations and visualization. *Maple* is available on all campus network computers, though if you would like to purchase a student copy for your own computer, you can find information at https://webstore.maplesoft.com. Freeware alternatives to *Maple* are Sage (http://sagemath.org) or SpaceTime (http://www.spacetime.us), or the web-based WolframAlpha (http://wolframalpha.com).

In addition, you will need to keep a journal specifically for this class. A spiral-bound notebook will be good (note that you may find a second or third book needed before the end of the semester).

2 Goals and Objectives

This course is a continuation of Math 170/171. We will focus on calculus of several variables. Thus we will revisit many of the techniques and ideas from first year calculus (limits, derivatives, optimization, integration), but in the context of higher-dimensional vector spaces.

This course will focus on developing reading and communication skills in mathematics. Much of the learning will be done *outside the classroom*, as you carefully read the material from the book and prepare for the in-class discussions. Time in class will be spent exploring the ideas presented in the reading and developing problem-solving strategies for the homework problems. Instead of midterms, you will be regularly asked to complete problem sets that encourage you to think deeply about the material presented in the text.

Through I work in the course, we will progress toward the following goals:

- Be able to read new material critically and apply the reading to new problems.
- Be able to express complete solutions and small proofs both orally and in writing.
- Be able to bring multiple ideas and techniques together to solve problems.
- Develop the capacity to utilize *Maple* in an effective manner, recognizing when it is and when it is not helpful.

[1] http://ocw.mit.edu/resources/res-18-001-calculus-online-textbook-spring-2005/textbook/ provides a direct link.

3 Grading and Assessment

Your course grade will be computed based on a raw percentage score, broken down as shown in the table below. Note that these numbers are to serve only as a general guide and your grade may be adjusted based on the judgement of your professor.

15%	Reading and journalling
15%	In-class work
45%	Problem sets
10%	Maple Projects
15%	Final problem set
100%	**Total**

When computing your score at the end of the semester, an A (+ or –) is typically given to a score of 85% or above, a B (+ or –) to a score between 70% and 85%, a C (+ or –) to a score between 60% and 70%, and a D (+ or –) to a score between 50% and 60%. These values are subject to change and are meant only as a rough guideline, and the final assignment of grades will be determined based on the performance of the entire class and the judgement of the professor.

Class format

The day-to-day plan for the class is as follows:

1. You read the required section for the class, and reflect on the key lessons and ideas in the reading. (see "Reading Responses" below for more information). Use your spiral notebook to keep a log of your work on problems, taking time to note particular difficulties you are having. In addition, you will be asked to work on several questions based on the reading.

2. In class, we will use your answers to the questions on the reading as a starting point for discussion (see "In-class work" below for more information). You will have an opportunity to edit and comment on problems in your notebook.

3. Every two weeks, you will be asked to submit a written problem set based on the readings and class discussion (see "Problem Sets" below for more information).

3.1 Reading and journalling

Most mathematical communication is through writing. We learn by working through mathematical texts. We enter new research by reading mathematical papers and essays. But reading mathematical writing is very different from reading fiction, history, or sociology. Each symbol and letter carries import. There is an expectation that the reader applies himself or herself to the text and fills in steps that don't seem clear. Reading just a few pages can easily take hours, and still require re-reading.

This semester, we will work on developing your skills in reading and writing mathematics. Before each class, you will be asked to read a section from the book or a handout. Through your written responses and our in-class discussion, you will develop your ability to read mathematical texts critically.

Before 7:00am on the day of class, you will e-mail me a written response to the reading for the day. In your response, you will include

1. A one-paragraph outline of the main points of the readings identifying the most important new concepts, techniques or theorems

2. The statement of a single question related to the material studied whose answer is nowhere addressed in the reading.

All reading response e-mails should be sent to `hartshorn@math.moravian.edu` with subject line `Math 211 Reading`. You will lose points for not using this address and subject line.

In submitting your response, you may use plain e-mail text. However, when notation is needed, you may also use *Maple*, *Word*, or LaTeX to write out your responses and simply attach the file to your e-mail.

You are encouraged to discuss the reading with your classmates before class. The readings are a key step in the learning process, and reading through the text with a classmate is an excellent way to make sense of the material. Note that everyone still needs to submit their own written reflections.

3.2 In-class work

In addition to the e-mail response, I will assign several problems connected to each reading. These problems are expected to be solve *before we meet in class* based on a careful reading of the text. Your in-class grade will be determined by your ability to contribute to the class discussion, largely based on your work on these questions.

Starting with these assigned questions, we will discuss problem-solving strategies related to the material and discuss the significant ideas from the text. I will act mostly as moderator for the discussion, offering perspective on how the material connects to other areas of mathematics or suggesting alternative problem-solving methods.

You participation grade will depend on:

- *Your attendance*: Keep in mind that I do not distinguish between "excused" or "unexcused" absences. Lateness will also be penalized.

- *Your engagement with the material:* Have you worked through the material, either bringing solutions to the class or contributing to the presentation of solutions? Are you actively participating in the discussion?

- *Your work with other students:* Are you contributing to the learning environment of the class? Are you contributing to group discussions? Are you giving other students a chance to reach their own conclusions about the material?

Twice during the semester and once during our final exam period, we will have one-on-one discussions to assess your progress in the class. During this discussion, we will discuss your class journal and come to an agreement about your class participation grade for that period.

The first round of one-on-one discussions will begin around February 7. The second round will likely take place the week of March 28.

3.3 Problem sets

There are 7 problem sets that will be assigned through the semester, due roughly every other week. These will help develop problem-solving strategies and calculus techniques from the relevant

readings. In addition, you will begin to consider how to write clear arguments in mathematics. Some key points about the problem sets:

1. These are *homework*. If you have questions about these, send me e-mail or stop by my office. We will not be discussing these in class until *after* they have been submitted for a grade.

2. These are *individual work*. You are **not** to work with your classmates on these problems. If you get stuck, please see me. Working together with other students on these problem sets or using resources that have not been explicitly allowed will be considered a violation of the Academic Honesty policy. In essence, consider each of these problem sets a "take-home exam." See the Academic Honesty section below for more details.

3. All solutions are to be written neatly *in complete sentences*. You are expected to show all important work and to explain the *solution* to the problem (not just the answer).

4. Homework must be handed in by 4:00pm on the due date. If you cannot submit it by the date due, you may submit it by the beginning of the next class period, but your score adjusted by a scaling factor of 0.8. Homework not submitted by that time will not be accepted.

5. Each homework problem will be given two scores, each on a scale of 1 to 3: one score for mathematical accuracy and one score for quality of writing. Each completed problem is thus given a score between 2 and 6. Skipped or missing problems will get a score of zero.

3.4 Maple Projects

There will be several projects through the semester that will require the use of *Maple*. Each project will ask you to use features of *Maple* to answer interesting questions.

These projects will be completed by groups working together and submitted as *Maple* documents. Details will be provided with the first assignment.

3.5 Final problem set

Instead of a final exam, there will be final problem set. This cumulative list of problems will be due at the end of our final exam testing period. It is roughly the equivalent of a take-home final exam.

Rules and scoring for this problem set are the same as for the other problem sets. However, I will not accept any problem sets submitted after the end of our final exam period.

4 Attendance and other Issues

4.1 Attendance

The core of this class is the in-class discussion. Each class meeting will be an important step in learning the material for the course.

Attendance is your responsibility. If you miss a class, you will receive a zero on the in-class grade for the day *regardless the reason for your absence*. In addition, you are responsible for any class notes and information that were taken during that class.

If you know that you will be missing a class (due to sports or other activities), let me know ahead of time. If there are special activities/handouts/etc. for that class, we can arrange to get you the information to help prepare for the next class.

Get to know your classmates! If you will miss a class on a day that homework is due, have a classmate bring your homework in for you. As a rule, late work will not be accepted. Note that you can submit reading responses from home.

4.2 Academic Honesty

Students are expected to adhere to the Academic Honesty policy as described in the Student Handbook (http://www.moravian.edu/studentLife/handbook/academic/academic2.html). Any violations of this will result in severe penalties on the assignment, a report to the Dean, and the very real possibility of failing the course.

Reading Responses

When faced with difficulty in mathematics, it helps to work through problem with a colleague. Thus I welcome and encourage you to work with friends, tutors and myself in working through the readings leading up to discussion. In the first weeks of class, I will encourage you to exchange e-mail address or cell phone numbers.

When you work through the problems connected with each reading, you are welcome and encouraged to work with your friends and classmates. Feel free to exchange ideas as your work through the reading problems.

HOWEVER: when writing your reading response, you should *work on your own.* The summary of the text and the question you raise should be yours and yours alone.

Problem Sets

Problem sets should be treated as take-home midterms. You may use your text, class notes/journal, any graphing or scientific calculator, *Maple*, or any of the resources described in the "Required Materials" section of this syllabus. Any materials or links provided on the class web page[2] may be used in completing problem sets. If you use *Maple* or any other computational technology, you are expected to clearly indicate how you used that technology in your solution.

You may not consult with friends, colleagues, or use any on-line/electronic resources other than those specifically permitted.

4.3 Final reminders, tips, and disclaimers

- **Visit my office:** I am more than happy to help work through the readings, address any questions you have about the problem sets, or talk with you about the progress of the course. Feel free to stop by to ask questions about being a mathematics major, about life at Moravian, or just to let me know what's on your mind.

  You can also communicate with me via e-mail (hartshorn@math.moravian.edu).

[2] http://math.moravian.edu/hartshorn/211

- This syllabus is subject to change through the semester. The most recent version of the syllabus can be found at `http://www.math.moravian.edu/hartshorn/211/`.
- If you are in need of special accommodations due to a disability, please contact the Learning Services Office and me as soon as possible, so that we can make appropriate arrangements.
- Final determination of your course grade is subject to my discretion as professor of the course.